Arash Dehghan

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Education

Toronto Metropolitan University — Toronto, ON
PhD Candidate, Industrial and Computer Engineering

Toronto Metropolitan University — Toronto, ON
MSc, Applied Mathematics

Wilfrid Laurier University — Waterloo, ON
BSc, Mathematics

Professional Experience

Machine Learning Engineer
HubHead – Toronto, Canada [2023]

- Developed machine learning models for various NLP tasks: text classification, sentiment analysis & named entity recognition.
- Trained and deployed various embedding algorithms such as Word2Vec, Node2Vec, and DeepWalk.
- Conducted data pre-processing, cleaning, and feature engineering for text preparation.
- Designed and executed experiments to fine-tune model hyperparameters and optimize model performance.
- Developed machine learning and data pipelines & implemented GUI applications for organization-wide use.
- Translate complex machine learning and NLP concepts and results in a simple and concise manner.

Machine Learning Engineer
5REDO – Waterloo, Canada [2022 – 2023]

- Led the design and implementation of reinforcement learning algorithms for complex tasks, such as DQN and DDQN.
- Collaborated closely with cross-functional teams to define RL problem statements, requirements, and objectives.
- Conducted in-depth analysis of available data sources and integrated relevant data streams into RL pipelines.
- Managed the end-to-end RL development: formulation, pre-processing, algorithm selection, training, evaluation, deployment.
- Evaluated RL agents' performance via simulations and real-world testing, iteratively improving models via experimentation.

Data Scientist
TMU Data Science Laboratory – Toronto, Canada [2019 – 2023]

- Conduct research in machine learning, reinforcement learning, dynamic programming, stochastic optimization & embeddings.
- Design experiments to evaluate reinforcement learning algorithms via model selection, hyperparameter tuning & data analysis.
- Implement deep learning algorithms in Python using TensorFlow, PyTorch, and Keras for real-world applications.
- Develop linear and integer linear programming models using CPLEX to solve complex optimization models.
- Publish and present work regarding node embeddings, approximate dynamic programming, and deep reinforcement learning.
- Automate and conduct simulations on cloud platforms such as Google Cloud and Compute Canada Servers.
- Proficiently training students to use software's such as Python, R, SQL, VBA, SAS, MATLAB, MongoDB and Tableau

Publications and Technical Projects (GitHub)

Evaluating Node Embedding of Complex Networks (Paper | Code):

- Conduct experiments with graph embedding algorithms on real-world and artificial networks.
- Evaluate embedding quality based upon node classification, community detection, and link prediction.

Improved Approximate Dynamic Programming for On-Demand Ride-Pooling (Paper | Code):

- Construct the problem setting as a Markov Decision Process (MDP) and formulate & construct a linear program (LP).
- Develop an Approximate Dynamic Programming (ADP) approach for optimizing on-demand ride pooling services.

Neural Approximate Dynamic Programming for Order Dispatching (Code):

- Compose an MDP model for the problem setting and develop an integer linear program (ILP)
- Propose a Neural Approximate Dynamic Programming (NeurADP) solution methodology.
- Provide comparative analysis of proposed policy with deep reinforcement learning (DQN & DDQN) and myopic policies.

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Technical Skills

- **Strong working knowledge of: Python, Julia, R**
- **Experience working with: SQL, VBA, SAS, Tableau, MongoDB, MATLAB, LaTeX**
- **Knowledge of and experience with machine learning and optimization libraries: TensorFlow, Keras, PyTorch, CPLEX**
- **Experience in data manipulation, analytics, and visualization libraries: Pandas, Numpy, Plotly, Matplotlib, SciPy**
- **Reinforcement learning: Markov Decision Processes, Approximate Dynamic Programming, Deep Learning**
- **Proficient in utilizing node embedding algorithms for node representation: Node2Vec, DeepWalk, LINE, SDNE**
- **Excellent mathematical ability & problem-solving skills: Calculus, Linear Algebra, Differential Equations, Statistics**
- **Experience in using Microsoft Productivity Tools: Word, Excel, PowerPoint**
- **Working knowledge of software revision control systems such as GIT**
- **Familiar and comfortable with using Linux, Windows, and Mac OS X platforms.**
- **Native languages spoken: English, Farsi**
- **Highly skilled in data cleaning and preparation for machine learning and reinforcement learning pipelines.**
- **Extensive experience testing, debugging, and maintaining large-scale computer programs.**
- **Exceptional writing ability as demonstrated through successful publication of scientific papers.**
- **Outstanding communication and public speaking skills.**

Awards and Scholarships

- **Queen Elizabeth II Graduate Scholarship ($15,000)**
- **MITACS Research Award ($6,000)**
- **Ontario Graduate Fellowship ($12,000)**
- **Graduate Development Award ($2,000)**
- **Mathematics Graduate Award ($1,000)**
- **Equity & Inclusion Award ($1,000)**

Volunteering Experience

GRAD Mentor (2022-2023)
Toronto Metropolitan University

- Mentor prospective undergraduate students through graduate study applications process.
- Assist in developing research interests and craft strong personal statements.
- Provide insights on navigating the graduate school environment to succeed academically and professionally.

Warehouse Team Member (2017)
Seva Food Bank

- Provided administrative support, including data entry, to ensure smooth operation of the food bank.
- Sorted and organized food items and packaged meals for distribution
- Collaborated with fellow volunteers to create a welcoming and inclusive environment for clients.

Support Staff (2017)
Seva Food Bank

- Create a safe and nurturing environment to meet their physical and emotional needs.
- Facilitate educational and recreational activities, such as arts and crafts, games, and sports.
- Support the PLASP team in maintaining a clean and organized space.
- Ensure that all safety protocols were followed to ensure the well-being of the children.